REMARKS

Claims 1, 3 and 5-8 are all the claims pending in the application. Claims 2 and 4 have been canceled without prejudice or disclaimer. Claims 5-8 have been added. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Claim Rejections - 35 U.S.C. § 102

- *The Examiner rejected claims 1 and 3 under §102(e) as being anticipated by US Publication 2004/0171456 to Greenwood (hereinafter Greenwood).*

Applicants respectfully traverse this rejection because Greenwood fails to disclose all of the elements as set forth and arranged in the claims. Claim 1 has been amended to incorporate subject matter from claim 2 and, therefore, this rejection is believed to be moot.

Claim Rejections - 35 U.S.C. § 103

- *The Examiner rejected claims 2 and 4 under §103(a) as being unpatentable over Greenwood in view of Applicants' allegedly admitted prior art as illustrated in Figs. 4 and 5 of the present specification (hereinafter the AAPA).*

Applicants respectfully traverse this rejection, in as much as the Examiner may now attempt to apply it to claim 1, because the references fail to teach or suggest all of the elements as set forth in the claims.

First, Applicants' comments in this regard as set forth on page 4 of the May 15 Amendment are still pertinent and, therefore, are incorporated herein by reference. In summary, Applicants argued that Greenwood fails to teach the use of a difference between oil pressures in a pair of oil pressure chambers to set a target oil pressure, as claimed. Instead, Greenwood's arrangement determines whether PH > PL, or PH < PL, and then uses the higher pressure. However, Greenwood's arrangement does not utilize PH - PL, as does the presently claimed subject matter.

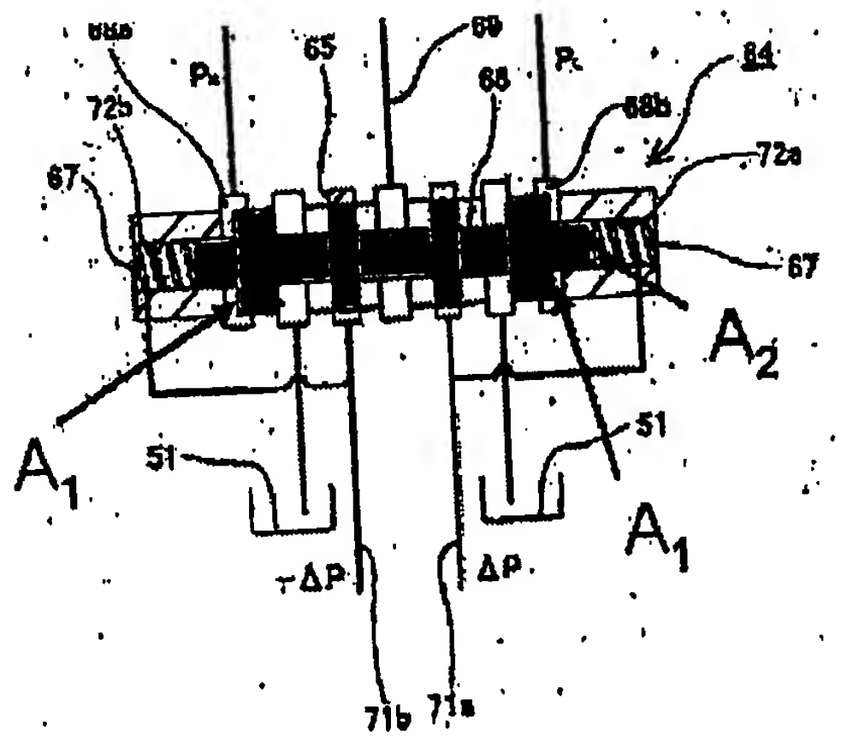
Second, a further explanation of how the present subject matter uses the difference in oil pressures to detect the force to be transmitted to the first and second disks is set forth below.

Regarding Valves 64 and 56

Initially, an explanation of how the valve 64 works and detects a difference ΔP between oil pressures PH and PL with reference to Fig. 3 (reproduced below, and annotated) of the present application.

(i) PH > PL

When PH > PL, the spool 66 (darkened member) is moved to the right in the figure (as reproduced here) so that the line 71b (-ΔP) is connected to the tank portion 51 and the line 69 (Pload) is connected to the line 71a (ΔP) and the right end chamber of the spool 66. In this situation, the following expression is satisfied:



$PH \times A_1 = (PL \times A_1) + (\Delta P \times A_2)$

thus, $\Delta P = (PH \times A_1 - PL \times A_1) / A_2$, and

then , $\Delta P = (PH\text{-}PL) \times (A_1/A_2)$,

wherein: A_1 is the area of the spool 66 in the pilot portion 68a, and

A_2 is the area of the spool 66 in the right end portion.

On the other hand, the pressure of the line 71b, -ΔP is 0 since the line 71b is connected to the tank portion 51.

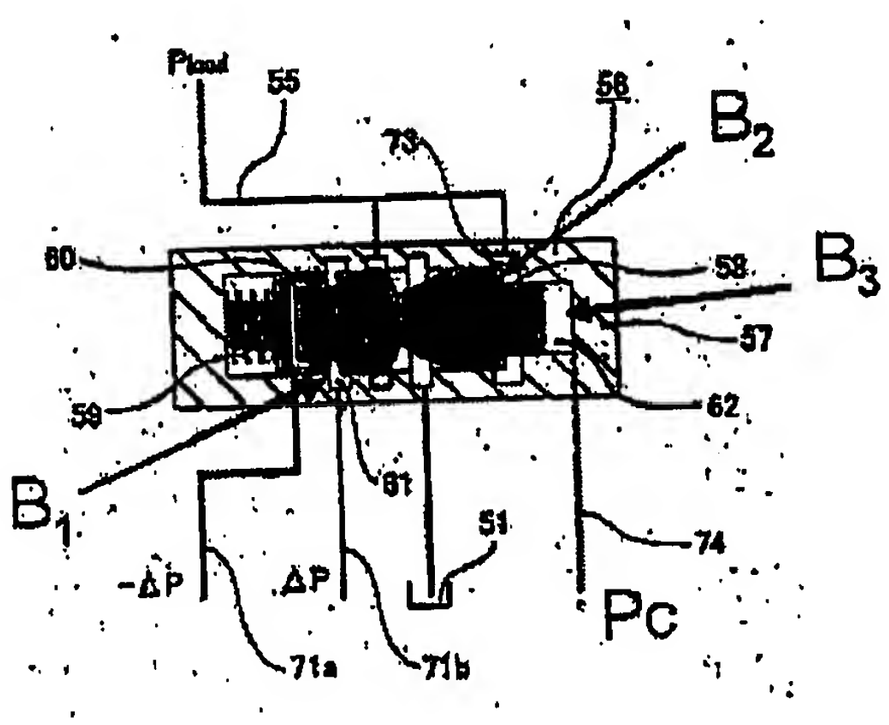
(ii) PH < PL

When PH < PL, the spool 66 is moved to the left so that the line 69 (Pload) is connected to the line 71b (-ΔP) and the left side space of the spool 66 and the line 71a (ΔP) is connected to the tank portion 51. In this situation, an expression similar to that shown above is satisfied. Accordingly, the difference ΔP between the oil pressures PH and PL is detected.

Next, an explanation of how the valve 56 works, and determines Pload which is introduced into the pressing device, will be set forth with reference to Fig. 2 (reproduced and annotated below) of the present application.

(i) PH > PL

As explained above, when PH > PL, the pressure of line 71b is ΔP and the pressure of line 71a is 0. The spool 58 is moved to the right. Then, the line 55 is connected to the tank portion 51 so that oil from the line 55 (Pload) partially flows to the tank portion 51 and the rest flows into the pressure chamber 73. The third pilot portion 62 is connected to the line 74 in which the pressure of oil is a correction pressure Pc determined based on the optimal value calculated electrically. In this situation, the following expression is satisfied:



$$Pload \times B_2 + Pc \times B_1,$$

$$\text{thus, } Pload = \Delta P \times B_1/B_2 - PC \times B_3/B_2 ,$$

wherein: B_1 is the area of the spool 58 in the pilot portion 61,

B_2 is the area of the spool 58 in the pressure chamber 73, and

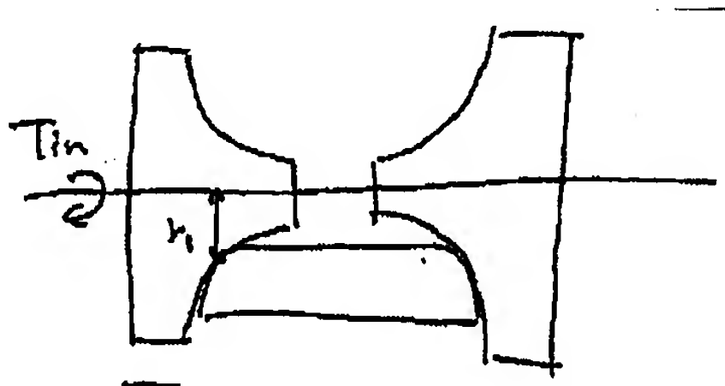
B_3 is the area of the spool 58 in the pilot portion 62.

Accordingly, Pload is adjusted optimally, taking into consideration the transmission ratio, the temperature of lubricating oil and the rotation speed of a drive source. In addition, by determining A_1, A_2, B_1, B_2, and B_3, suitably, Pload is adjusted to the oil pressure necessary for the pressing device to generate a pressing force necessary when a transmission ratio between the first and second disks is a transmission ratio requiring a maximum pressing force as set forth in claim 1 when the correction pressure PC is 0 because of electrical failure.

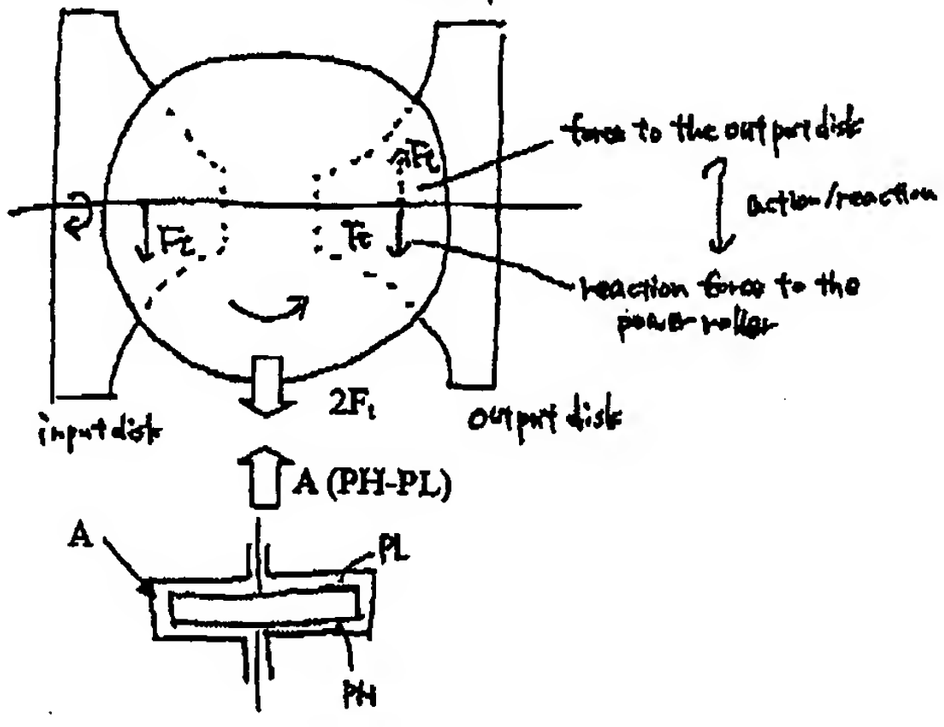
(ii) PH < PL

As explained above, when PH < PL, the pressure of line 71a is $|-\Delta P|$ and the pressure of line 71b is 0. Thus, an explanation similar to that set forth above applies here as well.

Regarding detection of the force to be transmitted between the 1st and 2nd disks



The force to be transmitted between the first and second disks is an input torque. So, it is explained here (with reference to the explanatory figure reproduced here) how the input torque is detected with a difference between oil pressures.



Considering equilibrium of force in the power roller, the following Expression 1 is satisfied:

Expression 1: $2F_t = A (PH - PL)$,

wherein:

F_t is the force transmitted from the input disk to the power roller, and

A is the area of the cylinder of the actuator.

On the other hand, F_t is calculated with the following Expression 2, which is a general definition of torque:

Expression 2: $F_t = T_{in} / r_1$

wherein: T_{in} is the input torque of the input disk

r_1 is a radius of a contact point between the input disk and the power roller

Actually, input torque is transmitted with plural power rollers so that the following Expression 3 is satisfied:

Expression 3: $F_t = T_{in} / (r_1 \times n)$

wherein: n is the number of power rollers.

Because n is a predetermined number, and r_1 is calculated using the shapes of the power roller and the disk, and transmission ratio, the input torque T_{in} is obtained by the difference between oil pressures by using Expressions 1 and 3.

In light of the above, it is seen that in the presently claimed invention a difference between oil pressures in a pair of oil pressure chambers is used to set a target oil pressure. In contrast to that claimed, Greenwood merely uses a higher pressure wins arrangement to obtain the greater of the pressure PH and PL, which is subsequently used in the determination of force to be applied between the disks. The AAPA fails to cure the above-noted deficiencies in Greenwood.

Thus, for at least the above reasons, Greenwood and the AAPA fail to render obvious Applicants' claim 1. Likewise, these references fail to render obvious the dependent claims 3 and 5-7. Further, for reasons similar to those set forth above, these references fail to render obvious Applicants' new claim 8.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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